

*Reynolds (Ed.)*  
*Educator*

ON THE

IMPORTANCE OF A KNOWLEDGE

OF

THE PRINCIPLES OF PHYSIOLOGY

TO

PARENTS AND TEACHERS.



BY EDWARD REYNOLDS, M. D.

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PHYSICS

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## PRINCIPLES OF PHYSIOLOGY.

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AN uncommon attention to the cause of Education distinguishes the present age. The public mind seems to be fairly awake to its high interests. A just perception of the infinite superiority of mind over matter begins to pervade all classes of the community. This is seen in the liberal patronage bestowed on all institutions for the advancement of the human intellect; in the increasing number of our schools and seminaries of learning; in the various improvements that have superseded former modes of instruction; and in the concentrated efforts of many minds for the purpose of still further promoting the cause of education. We behold it in the evident extension of knowledge among all classes of our citizens, in our crowded lecture rooms, in the multiplication of books, and the daily increasing facilities for mental cultivation. It appears also in a general amelioration of manners; an improvement of morals; and the happy and prosperous condition of the community in which our lot is cast.

It is seen in the attempt to adapt our institutions to the wants of all ages; from the little child who is taking his first step in the path of knowledge, to the full grown man who is about to assume his part in the practical struggles of life.

We rejoice to see it in the annual assembly of this Institute of Instruction ; composed of enlightened and liberal minds ; animated with the desire of promoting the interests of sound learning ; and convened to deliberate on the best means of effecting its important objects.

The philanthropist rejoices when he beholds it. He is filled with strong hope ; and cheered with no ordinary expectations for the future. No lover of our republican institutions, no friend to the best interests of man, can regard it with indifference. The cause of rational liberty and sound morals, and the cause of education have one common bond of union. They must stand or fall together. It is only by promoting the latter, that we can lay the foundations of our happy institutions broad and deep ; and erect a superstructure of enduring strength.

The physiologist also rejoices at it ; but with fear and trembling. He sees much in it to excite alarm, as well as to animate hope. At a period like the present, when the cause of education has taken such strong hold upon the mind, and literary excellence has become one of its chief desiderata, he feels it to be peculiarly necessary that its dangers as well as its blessings should be accurately pointed out. Otherwise, the good work, thus auspiciously begun, may be seriously retarded, and the high hopes it has excited, may end in disappointment.

It is well known, that deranged health is one of the common consequences of a studious life. This is especially true among the young. The history of literature, in all ages, presents melancholy instances of superior minds, over which the grave has prematurely closed ; of genius formed to take a long and adventurous flight ; and talent whose bright beginnings gave the promise of enduring fame, suddenly extinguished. Nor do our times, with all their boasted improvements, fail to swell out the melancholy list. The path of science is still beset with many dangers. The pallid look, the dull eye, the weary gait, and the emaciated forms of many of our most promising

youth, cannot have escaped the notice of every careful observer ; nor failed to excite the apprehensions of every faithful parent and teacher.

These facts show too plainly that all is not yet right ; that our modes of education are not yet perfected ; that the reform is not complete ; that there is still some rubbish of the departing system to be cleared away ; and much in our imagined advancement that does not deserve the name. They mingle too many apprehensions with the high hopes that spring up in the mind, when it surveys the improvements of the day ; and they should excite us to a more diligent inspection of the various causes that lie at the foundation of these dangers.

A double diligence is necessary at this time, since the very improvements in education, over which we rejoice, have kindled a spirit, which to a certain class of minds, and that the best class, is full of danger. They have multiplied the means of supplying a literary thirst, and multiplied, at the same time, the temptations to sacrifice health and strength to the desire of cultivating the mind.

Far be it from us, to say anything to repress this desire, where it does not exceed its proper bounds ! We are not among the number of those who believe that ill health is a necessary consequence of study. The frequent failures that come under our observation, especially among the young, are to be attributed to many other causes. It is the unfavorable circumstances under which study is performed. It is crowded rooms ; improper hours, transgressing upon the period of sleep ; positions unfavorable to the freedom of the corporeal functions ; improper diet ; excessive action of some organs, with unnatural repose of others. It is overlooking the peculiarities of the system, dependent upon various ages, and different temperaments ; tasking the mind with excessive duties, or at unfitting times. It is a spirit of competition, wholly unworthy the true lover of learning ; an unholy competition, that should be

repressed rather than encouraged; a competition that protracts the labor of the mind, long after the changed countenance has uttered the warning voice, that nature demands repose. It is these and many other habits, at variance with the laws of physical education. Finally it is the false feeling, which would raise man above the sphere in which the Creator has placed him; which leads him to act as if he were all spirit; and makes him forget that he is half flesh.

Before the world sees the perfection of which the mind is susceptible, and the height and depth of discovery, it is destined to make, it must retrograde, if I may so say, and learn to appreciate more accurately the importance of the body. It must learn to trace and understand the inseparable connexions, however humbling to an unphilosophical pride, between mind and matter; to perceive the thousand exquisite sympathies existing between them; and the manifold ways in which they act and react upon each other. It must take such a deep look into the body, as will teach more effectually than has ever yet been done, that every system of education, which is not in strict, accurate conformity to the laws of health; every system, where the physical does not keep exact pace with the intellectual nature, is radically defective; and cannot produce a sound mind or a sound literature.

The relations subsisting between literature and the health of scholars, would form a curious subject of inquiry. Perhaps it might appear, that not a small portion of all that is weak in judgment and false in taste, was intimately dependent upon the diseases of the body. The body and mind are united by such peculiar, mutual sympathies, that a healthy literature perhaps depends much more upon a healthy body than is commonly supposed.

A more serious attention to this subject is forced upon us at the present time, by many melancholy facts. Its importance has been painfully engraven by medical experience, on my

own mind. I have witnessed many instances of disease too evidently the result of overaction of the mind in early life. It was my painful duty a few weeks since, to see the earthly career of a young lady, whose uncommon promise had excited the attention, and interested the feelings of many hearts, forever closed, by disease of the brain; which, from its history, progress and post mortem examination, proved to be, beyond a doubt, the result of undue use of the mind in her course of education. The malady, as is too often the case, made its insidious entrance to the system, by symptoms so slight that they occasioned no alarm, until it had obtained a fatal grasp, for the removal of which, all the efforts of art were unavailing. I could point to other individuals who have been the subjects of the same affection, and who were saved with much difficulty. I now know others, for whose safety I feel great apprehension. These cases are more numerous than is commonly supposed. Their true cause often remains undetected. They show that, in an ardent ambition, on the part of children, their parents or teachers, to cultivate the mind, the body has been too much overlooked.

Abundant evidences of this mistake, also appear in the present condition of our studious men. How many of them are suffering from infirmity and disease! How many minds, once bright and active, are condemned to a life of diminished usefulness by the horrors of dyspepsia! How much talent lies dormant by the morbidly sensitive eyesight occasioned by inordinate and untimely use of the eyes! This last mentioned evil is increasing to a fearful amount among the young. Accurate inquiries have convinced me, that a large number of these individuals must go back to the school room, to find the source of their infirmities.

All those habits, therefore, in our modes of education, that exert an unfavorable influence upon the body, and which, through it, may sooner or later injure the mind, are immensely

important; and imperiously demand a more faithful investigation from parents and teachers, than they have yet received.

Before proceeding any farther, permit me to call your attention more particularly to the union existing between the body and the mind, and the constant, unavoidable influences they exert upon each other. The existence of these reciprocal connexions is the first and most striking fact presented to the student of man. Of the philosophy of this union, we know almost nothing. It is one of the most curious, unfathomable subjects ever presented to the human mind. The more the mutual action and reaction of the body and mind is examined, the more wonderful it grows. The Creator has never withdrawn the veil of obscurity that hangs before it. Its nature and causes have not been revealed; yet we are permitted, as in other mysterious subjects, to behold and understand its effects. The more these are observed, the more we shall become convinced, that the individual who wholly disregards them, is unfitted for the occupation of a teacher of youth.

These effects are the subject of constant observation. We behold them daily in the strange play of the passions. Observe the stormy circulation, the convulsive muscular motions, the foaming mouth, and the glancing eyes, so instantaneously produced by a fit of anger. Grief makes its insidious entrance to the very citadel of life; and weakens its forces, one after another, until by slow degrees, they lie prostrate before its paralyzing energies. Extreme joy may destroy life. The passion of fear diminishes insensible perspiration; weakens the pulse; empties the vessels of the skin; and robs the muscular system of all its power. The most trifling derangements of any of the organs of the body sometimes generates a moping melancholy or a wild delirium, that endures through life.

The mental operations are also constantly modified by the varying conditions of the body; by hunger and thirst; by immoderate nourishment; even by the slightest change of air.

Who is ignorant of the wretched effects of an east wind upon the body, soul and spirit? The energies of the stomach are suspended by intense application of the mind. Who has not occasionally forgotten his dinner, while engaged in severe thought? What physician has not seen the power of thought wholly destroyed by acute pain? How is the memory impaired, the judgment weakened, and the imagination diseased by the slightest disorder of the digestive organs! Whence the opinion of the ancients, that the stomach was the seat of the soul, but from the various and opposite affections of the mind so uniformly dependent upon its healthy and unhealthy conditions? The experience of every observer has taught, that the judgment is less clear after a full meal than before. What remarkable differences in the character of mind, temper and dispositions are invariably connected with the different temperaments of the body! Who does not know, for example, the influence of the liver upon the temperament? 'Its predominance over the other organs throws over the external habits, the functions, the passions, the character itself, a peculiar cast, remarked by the ancients; and fully confirmed by modern observers.' Differences equally remarkable are uniformly true of the sanguineous and other temperaments.

These are a few of the thousand examples that may be cited, to show the existence of a close and wonderful union between the body and the mind. They are noticed thus particularly here, because they lie at the very foundation of what is to follow. Its important connexion with the subject of education appears on the slightest reflection. An accurate knowledge of all its bearings would aid in suggesting valuable improvements; and banishing a multitude of evil habits; which cannot fail to injure the body and the mind.

The question naturally arises here, how shall the parent and teacher obtain the clearest views of these connexions and

reciprocal influences between the body and mind, in order to be qualified to prevent the injurious habits that render study dangerous to health; and to adapt such measures in the domestic arrangements and school regulations, as will secure to children the double advantage of a sound cultivated mind and vigorous health?

We answer, this can only be effectually done by a knowledge of the principles of physiology; or the science that treats of the phenomena, conditions and laws of life; explains the healthy functions and uses of the various organs of the body; examines the different systems that compose the whole man; with all their mutual connexions, dependences and sympathies, in the several stages of life; from his first formation to the period of decay and death; ascertains which of these systems exerts a preponderating influence and action in the different stages of his being; and shows the consequences of such preponderance on the individual during their continuance; and the dangers to which it exposes him. It is the science that traces the intimate relations subsisting between the animal, intellectual and moral life; describes the manner in which the mental operations depend upon the arrangement, organization and powers of the body; and the influences which the various functions, respiration, digestion, circulation, nutrition, &c, exert upon the activity of the mind; and explains the mutual changes they are capable, through unnatural excitement, of producing upon each other.

Such is physiology. As it is the only safe guide that directs the physician through the many obscure, and devious paths of disease, so it affords the best light by which the parent and teacher can detect the various dangers that lie concealed in the path of youth.

It is evident from the above definition, that physiology opens to the view a vast field, which the present occasion does not permit us to explore. We can only enter it; and

gather up some of the facts that lie upon its surface ; that as parents and teachers, we may be animated with a stronger desire to find the hidden treasures of knowledge it contains.

1st. In the field of physiology, we learn the fact so important to be well understood and thoroughly appreciated in its connexions with education, that the brain is the organ of thought ; the instrument with which the mind, during its abode in the body, performs all its functions ; and that it is also the great source and centre, whence vitality flows out to all the various parts of the body ; supplying them with the living energy so necessary to healthy action.

2d. Here too, we learn that it is subject to the same laws that regulate the functions of all the other organs ; that these laws cannot be violated with impunity by the brain any more than by the stomach or liver ; that like them, from the very constitution of nature, it must have its alternate seasons of labor and repose ; that the brain cannot be always thinking any more than the stomach can be always digesting, or the muscles always moving ; that like them, it is nourished and supported by arterial action ; that when the amount of this rises to a certain degree, it is a condition of health ; and that when it exceeds this, it is a condition of disease. Intemperance in study produces an unnatural determination of blood to the head, as certainly as intemperance in the use of ardent spirit does to the liver. Whence the pain, sense of heat and confusion of head, experienced after a season of severe mental labor ? What is it but an increased action of the arteries supplying the brain ? Look at a man who has been for a long time engaged in active thought, or excited by the heat of composition ? What occasions the flush upon his cheek ? Whence the unusual beating of the carotid arteries ; and why for some time after he has discontinued his labors, does he feel the pulsations of all the cerebral vessels ? When he retires to

bed why does the excited condition of these vessels keep him awake for hours before he can compose himself to sleep?

Whence the total derangement of all the functions of the body, the paleness, debility, palpitations, languor, deep oppression of spirits, nay, the vomiting, epilepsy and death, by which learning has often been deprived of her brightest ornaments? Does not all this show a diminished action of all the organs, from the overloaded condition of the brain, whose office is to supply them with the energy necessary for the performance of their functions?

What shattered the gifted mind of Henry Kirke White, until it only gave forth those delirious wanderings, the precursors of the fatal lethargy that laid him in the grave? Why was this interesting youth destined so soon to fulfil the almost prophetic creations of his own fancy, when he said, 'If I were to paint the picture of fame crowning a distinguished undergraduate, I would represent him as concealing a death's head under a mask of beauty.' Who does not see the same fact in the melancholy depression of mind that preceded the death-bed scene of the lamented Urquhart? What occasioned the unmeaning stare, and the faltering tongue, that first alarmed his physician? In the last act of his short, but brilliant career, who does not see clear evidences of an oppressed brain, even while the spirit of God was pouring its soothing influences on his departing soul?

All who read the history of such individuals, are ready to exclaim, it is undue use of the mind. But no definite ideas are attached to the words; and the evil is suffered to go on—physiology defines its meanings; and directs the vision to facts, which cannot fail to arrest the attention, and command obedience. Under its light, the obscurity that hung so long over these cases, breaks away. Physiology proves it to be pressure, downright pressure upon the brain. It shows the arteries under the stimulus of intense or too long protracted thought,

assuming an unnatural action ; sending more blood to the part than its tender substance can bear ; until at last, the point of safety is past ; and lingering disease of all the organs, to which the healthy condition of the brain is indispensably necessary, unfits the student for extensive usefulness ; or fatal disease blasts his hopes, and lays him in the grave.

3d. Physiology directs the attention to another very important fact, viz., the predominance of the brain and nervous system over all the other systems of which the body is composed, during the periods of infancy, childhood and youth. The brain of the newborn infant is immensely large in proportion to the other organs. The head forms at this age one third of the whole mass of the body ; while in adults, it is only an eighth. The same is true of the nerves. They are proportionally larger than at any subsequent period ; so that no anatomist would think of selecting any other subject for the study of these parts.

4th. The blood vessels supplying these organs are also proportionally larger, and more numerous than at any subsequent time.

This extraordinary development of the brain and nervous system, and this condition of its blood-vessels, continue to preponderate over all other organs, though it is constantly and gradually diminishing, until the age of puberty ; when it yields partially to new influences, the result of another system coming into action. It continues, however, notwithstanding these, until nearly the adult age, when something like a general equilibrium is established between the different systems.

5th. Another very important peculiarity of the brain at this period of life, is its softness. It is found on examination to be much more tender in its structure than at any subsequent age. This difference is so striking, that the brain of an old man is always preferred by anatomists, for the purposes of dissection in the study of this organ ; because it is so solid, and

breaks with much less facility. Its vessels are also diminished in proportion to its increased hardness. This fact explains the difference in the color of the brain in infancy, youth and old age. In the two first, it always presents a pinkish hue ; while in the latter, it is of a dull, tarnished color.

This arrangement of the Creator, exhibits an exact adaptation of physical structure to the nature, design, the peculiarities and wants of childhood, youth, and all the intermediate stages of life, on to old age. It is one of the most striking instances of beautiful harmony between the physical, intellectual and moral nature of man, in the several great periods of his existence.

The newborn infant is the most helpless of all creatures. He has not the instinct of other animals. He is destined to be the child of experience. During the first portions of his being, therefore, his structure should be such as would peculiarly fit him for the acquisition of knowledge ; such as would make him the creature of sensation and motion. The above mentioned predominance of the brain and nervous system, and its tenderness and pliability is precisely that arrangement required by this necessity. If not obstructed by false habits and false modes of instruction, its evident intentions would be fulfilled in the most perfect manner.

Youth, therefore, is, as the physiologist expects, and hopes to find it, full of life and vivacity. Its senses are all wide awake. Its ears are alive to every sound ; its eyes open to every object. Its limbs are ready to obey with alacrity the impulse of every sensation. It overflows with warm feeling, quick sensibility and lively imagination. It is impatient of confinement and restraint. It is endowed with an amount of vitality, which, to prevent suffering, must expend itself in vigorous action. It has consequently a desire for constant motion, which nothing can repress. Activity of mind and body are as natural as breathing ; and it is as impossible for him, from

his very physical structure, to live without the one, as the other.

The physiologist expects to find him as he is. When he examines the structure and condition of the brain, and compares it with other periods of life, when he sees its softness and flexibility, and the full developed nervous system, he expects to find all his senses acute. He expects to find him easy to be instructed; and capable of learning with more facility than in after life, when the fibres of the brain have become more rigid. His astonishing memory and his imperfect judgment are precisely what he expects to find. He does not look upon this interesting age with anger, because it cannot comprehend dry grammar and thorny syntaxes, and takes no delight in mathematics and logic. In the pleasure with which it pursues all physical objects, and drinks in the treasures of knowledge that flow from them, he feels a full sympathy; and sees only the harmonious workings of nature, and the perfect adaptation of the dispositions and faculties of the mind to the physical structure of infancy and early youth.

In the same cause, in part, a difference of structure, he finds a ready explanation of the warm heart, the noble aspirations, the daring courage, and the passion for the stormy scenes, which characterize the young man; the steady perseverance, with which, in middle age, he pursues the sober realities of practical life; and the preference uniformly discovered by the old man for retirement, silence and shade.

6th. But in this full development, this preponderating influence of the brain and nervous system, so admirably calculated to secure and advance the moral, intellectual and physical progress of youth, the physiologist discovers causes of anxiety and alarm as well as gratulation. He knows that those organs which predominate in the several stages of life, are most liable, during those stages, to become diseased. In youth, as already stated, it is the brain and nervous system. Consequently, it

is in these organs, that we are to look for the diseases constituting its peculiar dangers. Whoever observes the diseases of children cannot fail to notice the frequent affections of the brain and nervous system; and the readiness with which these parts enter into diseased sympathy with all the other organs; how easily the brain becomes affected with epilepsy, convulsions and dropsy from the slightest causes.

Physiology teaches that this delicate structure is destined to receive, according to the calculations of Haller, from one third to one half of the whole mass of blood, thrown out at each contraction of the heart. It exhibits all the wonderful contrivances of structure formed by the Creator, to break the force of this immense column of blood; so that it is wholly turned out of a straight course; and loses a great portion of its momentum before it reaches the brain, and comes at last, like light to the eye, in so gentle a manner, as to be void of all danger. It shows also the equally wonderful contrivances to secure its return back to the heart, not only without the least delay, but with the utmost possible rapidity. We are taught by all this care with which it has been guarded, and by various phenomena, that the brain, though the very fountain of life and intelligence, the supreme arbiter of the health and strength of all the other organs, is itself in the midst of dangers, which if not thus guarded against, would be liable every moment to impair its energies, or destroy its functions. From all this we gather up a lesson of wisdom; and obtain a practical perception of some of the dangers that beset the path of education.

The simple statement of these facts shows the importance of physiological knowledge to parents and teachers, in the education of youth. If I mistake not, they enable us to detect with ease, some of the errors that prevail in many schools; and which, by their unfavorable influence upon health, may sooner or later injure the mind.

Among these may be ranked, all those regulations which tend

to force pupils to too great mental action. Is not this the great mistake of the present time? Have we not been led by the pride of what is called 'the march of mind,' to throw too much duty upon children, especially upon those who are very young, whose brain, as we have seen, is very susceptible and very tender? Are not our little boys, for instance, of seven and eight years old, engaged in the study of mental arithmetic, geography, grammar, latin, parsing, reading, writing and spelling, from eight till twelve or one, in the forenoon, and from three to six in the afternoon? And as if this was not enough, are they not obliged to gather about our tables in the evening, to worry over their home lessons; or hurry through their breakfasts in the morning, because exhausted nature has demanded full repose, and they have not awaked at a sufficiently early hour to master their task; and had rather lose their meal, than run the risque of being detained an additional hour in school, for missing a word, and lose their play? All this is true. Little boys of seven and eight years old! to whom, if nature's indications are worth regarding, play is so much more important than learning. Do they not come home to us after their seven and eight hours' imprisonment, out of humor, and pale? the bloom so natural to the age, faded from the cheek, and complaining of headache, and dizziness, symptoms so unnatural to the age?

A thorough appreciation of the above physiological facts would strike a deep blow at this unwise system; and prove that they, at all events, who have ambition enough, or fear enough, to conquer opposing nature, and yield to the labor and restraint of the school system, are doing almost anything rather than improving the mind. They are applying an artificial stimulus to the brain; increasing the action of its blood-vessels, breaking through the bounds set up by the Creator to protect the organ, diminishing the vital energy it should communicate to the body, and unfitting it for an instrument of

accurate, active and long continued thought. It may make them, as it often does, objects of pride and wonder to the parents, who see not the evils that are lurking beneath the system; but it may also render them blockheads in after life. The old nurse who is despised for superstition, when she gives utterance to her fears, by repeating the old adage, 'too smart for long life,' gives an evidence of wisdom which has been confirmed by the experience of all times.

The above facts also lead us to doubt the wisdom of keeping children, large or small, confined for so many hours, in school; and confined, as they generally are, on seats or at desks, where the body and limbs are cramped for want of room, with nothing to lean the back against for the purpose of resting the weary muscles, — expected often to sit up straight, — denied sometimes the poor privilege of leaning on the elbows for partial repose, because such a position is not sufficiently decorous; and all this for three, four, and sometimes five hours, with the exception of a short recess of fifteen minutes, — in beings too, whose very structure almost compels them to be in motion; to whom continued rest is punishment and pain. A little boy, who loves his books, said to his father in my presence, 'Father, I always wish when I am in school, that the four hours could go off in one, because my back and legs ache so, sitting.' What physiologist does not sympathize with the poor child, who has to bear, in his age of motion, a season of rest that would be intolerable to any parent or schoolmaster, even though they have reached the dull, uninteresting period, when the abdominal organs rule ascendant over the brain and nervous system? What mode more likely to render learning a toil, and to give the school-room the character of a place of penance? Does it not make children hate school? Is it not plain that any position, or any confinement which renders the body uncomfortable, acts at any age as a dead weight upon the mind; subtracts from it a

proportionate amount of power, and retards the intellectual progress?

Do not these facts call for a change; and convince us of the advantages of providing children more convenient seats; and allowing them the privilege so indispensable to our own happiness, of more frequent alternations of rest and motion; and of securing to them the benefit of everything that can add to their bodily comfort? Might they not perform a larger portion of their studies at home, where the limbs would have free play, and use the school-room more as a place of recitation?

Parents may also learn a useful lesson from these facts; by which they and their children would be spared no small amount of the mental irritation, occasioned in the family, by the impracticable attempts to detain their little ones in one place; to keep them still; to make them behave (to use the common parental phrase) like little ladies and gentlemen;—to the souring of much good temper, and the no small annoyance of both parties. A view of the condition of the brain and nervous system at this tender age, would convince them, that, when they thus attempt to force nature, they aim at an impossibility; that the child, like the bird of the air, is all nerve; and that it must move or die. The parental tyranny so often exercised in this particular, and which sometimes does not stop short of a smart box upon the ear; that most unphysiological and unphilosophical of all punishments, is a decisive evidence, if not of a hard heart, of a hardened brain; and is as inconsistent with physiological principle as with common sense.

A clear perception of these facts would lay the axe to the root of another very dangerous error, the unchristian spirit of emulation encouraged at some schools. Whatever beneficial influence this may sometimes exert upon dull and inferior minds, it is full of danger to those of a higher order. The boy

or girl who is the subject of this emulation, of which we hear so much now-a-days, under the phrase, 'keeping their rank,' no matter how it is excited, whether by silver medals or the weekly bill of marks, is in a constant state of feverish excitement; and occupied day and night in devising plans for the downfall of a rival. It is often a spirit that is not content with the perfect performance of school duties; it follows the pupil beyond the precincts of the school-room; and steals upon the hours that should be devoted to exercise and amusement; so indispensably necessary to the health both of body and mind. It is a spirit that grudges even the short fifteen minutes allowed for the recess. It encroaches also upon the hours of sleep.

Many of our girls under the influence of this spirit, perform an amount of labor, that would wear out any mind. Some do it from a consciousness of superior talent; some from a determination not to be outdone by them; others from the wounded feelings occasioned by standing far below. They rise at five in the morning, and study till breakfast time; from breakfast they go to the school-room; where they are engaged in recitations and study until one. The labor begins again at three, and continues till six. The evening brings no repose. At ten they lie down exhausted; and awake in the morning, to renew their mental toil.\* And what are the studies? Astronomy, Mental Philosophy, Algebra, Composition, Geography, History, Latin, French, Spanish and Italian.† All this is done too at that critical age when nature is striving

\* To many the Sabbath dawns no day of rest; and the expected analysis of the clergyman's discourse makes even the house of God a place of mental toil.

† Some of these studies would severely task old, hard brains. If the physical powers of children are strained, if the muscles and other organs are put to man's work, all know that premature old age is the inevitable consequence. By what law does the brain enjoy an immunity, when strained beyond its natural power, from similar danger?

to establish changes in the constitution of the utmost importance to its stability; and which peculiarly unfits it for the undue stimulus of any important organ, particularly such an organ as the brain.

Is it surprising that such labors, continued and kept up at this period, while the brain is yet tender, two, four, and six years, should lay the foundation of incurable nervous excitability, crowd the brain, and weaken its energies; produce dyspepsia, obstruct the bowels, debilitate the muscular system, empty the vessels of the skin, and sometimes depress the spirits, impair the memory, confuse the judgment, break down the power of thought, and wholly defeat the object of education? This is no picture of fancy. I am well aware that most youth do not injure themselves by study; and that the majority do not feel the stimulus of emulation to their detriment. But every physician in extensive practice knows that these consequences exist, in a greater or less degree, among many of our children; particularly our young ladies; and that the worst part of this description every now and then happens among our finest and brightest youth. I have myself known more than one individual who has fallen a martyr to it. One Kirke White, be it remembered, is worth many inferior minds.\* Whoever will study the biography of distinguished youth with this subject in view, will be startled at the amount of danger to which uncommon talent pressed on by this sort of excitement is subjected. The evil, to say nothing of its moral tendency, is so great, that when I see our pale, weary

\* Girls are subjected to greater danger, from yielding to the full influence of the school system, than boys. Boys have harder heads; girls have better hearts; more sensibility, more conscientiousness. Boys yield themselves to the full excitement of youthful games; and while their physical powers are strengthened by this best of all exercises, they forget the pride of success or the mortification of defeat at school. Girls are expected to go home with becoming gravity; and instead of the hoop and ball, to sit down to their needles, music and drawing lessons.

girls bring home their medals or their faultless weekly bills, it fills me with too much apprehension, to give me any pleasure. I asked one of these girls, who from the above causes had been the subject of a dull headache for two years, if she was obliged to study? 'Oh no,' said she, 'not unless I please.' Well, why do you? 'Why who,' said she, 'wishes to be thought a fool, and bring home once a week a bill, with nothing but ones and twos on it.'

But what shall we say of those individuals, who, though not stimulated by such means, overuse the mind from a native passion for learning? Physiology directing the vision to such cases as White, Urquhart, and our own beloved Buckminster, would throw discouragements in the way; and if these failed of success, would seek a remedy in parental authority. It would no more permit a child to destroy health, and induce premature mental decay by extravagant study, than to indulge in any other habit dangerous to health and happiness.

Is it not to these and other kindred causes, that we are to attribute the apparently strange fact, that such a small proportion of our brightest boys at school, fulfil in after life the promise of their early years? And that such a number who gave no promise in youth, so far outstrip them in practical life? How little is known of the juvenile progress of what are called our self-made men? To what is their signal success to be attributed? Is it not to the fact, that the brain was not overused in youth; and when ambition first seized upon their minds, it found them united to vigorous, healthy bodies; which enabled them to keep on untired in the race to the end?

Let not the indolent suppose that they can take shelter under these remarks. It is an excessive use of the mind only against which we declaim.\* Physiology also holds out a rod for the fool's back who wastes the period of youth in mental

\* It is what Solomon meant, who spoke like a physiologist, when he said, 'much study is a weariness to the flesh.'

sloth and inactivity. It shows them that they are also infringing one of her most important laws ; which requires that every organ, in order to obtain strength, must be made to perform a full, natural amount of action. The proper use of the brain is one of the reasons why the names of so many distinguished philosophers stand high on the scale of longevity. Activity of mind doubtless constituted one of the principal causes of their length of days as well as their happiness.

Among the customs to which a knowledge of these facts directs the attention, and which may injure the body by straining the mind, and wounding the feelings, is that of classing boys together, of different degrees of talent and various powers of mind ; and giving to each the same task and the same study, without any regard to the dispositions, nature and power of the mind. In every such class, there will be some two or three, who perform it with ease. They who come nearest to them, if ambitious, must keep near by an amount of labor and straining of the brain, wholly incompatible with its healthy condition. They who stand lower become disheartened and humbled ; and feel a disinclination for learning, which, under more favorable circumstances, might not exist.

All children are not qualified by nature for the same amount of labor, or the same kind. Is it wise that they should be all put to the same ? Perhaps it remains to be proved how far the science of phrenology is true, which attributes different faculties of the mind to differences in the structure of the brain. But all know that there are native and unconquerable varieties in the character as well as the powers of the mind. Some children are distinguished for memory, others for imagination. Some are peculiarly fitted by nature for the acquisition of languages ; others for mathematics and the abstract sciences. If it were possible to introduce the changes, which, in accordance with physiological principles, these native differences require, it would save an immense amount of useless straining

of the youthful brain ; much of the discouragement and mortification that besets the pupil's path ; and add more permanent and practical results to the cause of education. The persevering attempt to make the young mathematician contented in the magic regions of poetry, or to bring the soaring spirit of the youthful poet down to the accurate calculations of mathematics, will always be attended with a wear and tear of brain, as injurious to the cause of learning as to the health of the student.

1st. The light of physiology enables us to see and comprehend the curious mysteries of digestion ; that wonderful function, by which the foreign elements that surround the body, when received into it, are changed in their properties, animalized, and converted into its own peculiar substance. We see this new compound taken up by myriads of vessels prepared for that office ; carried into the heart, from whence they are conveyed by the arteries, and deposited wherever they are needed, to repair the waste perpetually taking place in the system. We see that this function, by which the body attains its great strength and wonderful growth, is infinitely more vigorous and active in infancy and youth, than at any subsequent period of life. It is this extraordinary activity that fits the body to be the residence of the mind, during the whole period of its existence here. The craving appetite of school-boys is the result of this arrangement. In order to be fitted for the sphere of duty to which the Creator designed them, they have a body to build up as well as a mind.

2d. Physiology reveals the intimate sympathies existing between the two organs, the brain and the stomach. It represents the brain as the source of all the power of the latter ; and teaches the reason why an enfeebled brain must necessarily occasion a weak digestion. To borrow a thought of Tissot, for the purpose of a short explanation, ' intense or too protracted action of the mind ties, as it were, a ligature about the nerves

proceeding from the brain to the stomach, which supply it with its energy, impairs its powers, and unfits it for the perfect performance of its functions.

3d. It also teaches that the digestive function is so immensely important to the animal economy, that when it commences, all the other functions proceed with diminished activity; that the whole power of the body may be concentrated, as it were, upon the stomach; and enable it to finish its task more perfectly. Hence, the dulness with which the mental operations are performed; the feeling of drowsiness that creeps over the system; and the indisposition for active movement of any kind, after a full meal.

The knowledge of these facts presents additional proofs of the danger of overtaking the minds of the young, by the above mentioned or by any other modes. The full grown philosopher, whose body has attained its period of perfection, may work his brain, until he loses his appetite, and forgets his dinner. Like Sir Isaac Newton, he may live whole days upon his cracker and cup of cold water; and perhaps, be fully compensated for the slight injury done to the body, by the additional clearness gained to the mind. But not so with the boy, who lives under the double necessity of building up the mind and the body together. If he persists in such a course, it is at the risk of an imperfectly developed body; which always has been, as the history of literature abundantly proves, and while the system retains its present sympathies and peculiarities, always will be but another name for an imperfectly developed mind.

Do not these truths suggest the propriety of attending to the periods of the day in which children shall be exercised with their severest studies? Are not the morning hours, for instance, better calculated for such branches as require close application of the mind, than the afternoon? Who does not know the (horrible) influence of a full dinner upon the clearness and power of thought? Digestion is performed with more ease

and rapidity in children than in adults. They, therefore, suffer less inconvenience from the infringement of this physiological law than the schoolmaster. Yet they suffer enough to render the subject worthy of consideration. If parents and teachers would permit their contemplations to descend a little from the upper, to the lower regions, — if like Lord Bacon and Plato, they would now and then leave the brain, and pay a visit to the stomach, and become better acquainted with its wonderful influences upon the memory, the imagination and the judgment, they would confer a better service upon the cause of sound learning, than by depriving a poor boy of his dinner for a morning misdemeanor; by prolonging the school imprisonment, as is too often done, for an imperfect afternoon lesson; or attempting to make the mind perform an impossible task by the stimulus of the birch or ferule.

Physiology teaches that violent exercise of the body is also injurious after a full meal. Does it not show the impropriety of compelling boys to run from their father's dinner tables, sometimes unavoidably in great haste, in consequence of the distance of the school-room; at others from the irregular hours of the family, over which they have no control, by the law which ordains that the door shall be closed upon every one who arrives after a certain hour? With what hope of success would the majority of boys thus conditioned, the stomach full, and obliged by this cause to perform extra labor, sit down to a lesson of obscure latin, or a difficult problem in mathematics?

But other evils are attached to the school room, which, like these, are contrary to physiological principles, and constantly tend to injure health. One of the most important is the bad air of many schools. Physiology, by making us acquainted with the curious phenomena of respiration, and the indispensable necessity of pure air to health, enables us to realize the full amount of this evil. It teaches that a very curious pro-

cess constantly takes place in the act of breathing ; that at each inspiration, the vital portion of the air called oxygen, separates from it, and unites with the blood thrown at each contraction of the heart into the lungs previous to its distribution over the body ; that it comes into the lungs black, loaded with carbonic acid, and other materials that unfit it to be again distributed to the body. It receives in the lungs the oxygen from the inspired air ; and acquires new vital properties, which again fit it for the purposes of life ; and imparts at the same time to the portion of air expired, its carbonic acid and other deleterious properties ; respiration, therefore, is one of the grand means by which nature unloads the body of a vast amount of the useless parts ever passing off in the great struggle of life ; and oxygenates and vivifies the new materials brought by digestion into the circulation to supply their place. This mighty process is very imperfectly effected by impure air. They who are obliged to pass a great portion of time inspiring it, incur the danger of having the vessels filled with impure blood. Is not this one cause of the pallid skins of our boys and girls ? Is it not because their blood is so imperfectly oxygenated in the impure atmosphere of schools, overheated rooms, and close, confined bed chambers ? Should it not awake a sufficient interest in the minds of parents and teachers to induce them to institute a more accurate inquiry ; and produce a reform ? What can be more unhealthy than many of our school rooms, crowded with a great number of children, breathing the same air over and over, until, to use the language of an intelligent pupil of one of our best seminaries, ‘ it becomes so oppressive and offensive, that it is absolutely necessary to raise the windows ; which must be done at the expense of the few, who, by their situation in the room, are exposed to a direct current of cold air. Ought not the teacher, she continues, to feel a responsibility upon this subject, and consider the proper ventilation of his school room as the first and most

important duty? What could be less conducive to health than the stifling atmosphere of a small and crowded room? Should not the temperature also be regulated by a thermometer, and not left, as it is, to chance and caprice.'

The above facts are well adapted to impress upon the mind the importance of a knowledge of the principles of physiology in the management and education of youth. Did time permit, many others might be adduced equally striking. These were selected because they seemed calculated to direct the attention to some of the most dangerous habits that prevail in schools. Among the great number, which the science presents, others might be mentioned; each peculiarly fitted to unfold other errors that tend to injure health; and to suggest their appropriate remedies.

I might explain to you the structure and functions of the osseous and muscular systems, and the laws by which they are governed, with their peculiarities in childhood and youth; and deduce from them the reasons, why so many of our educated females are deformed; walking wearily through our streets with curved spines; breathing with compressed lungs; the subjects of palpitations, debility and oppressions of the most important functions, which have placed them beyond the possibility of a radical cure. The origin of a vast proportion of these evils would be found in the uncomfortable, unphysiological accommodations of the school rooms, and the erroneous position which, as children, they were consequently compelled to assume. They would be found also in the false fashions originating in the pride or ignorance of mothers at home.

A more perfect knowledge of this science would convince us, that the general and indefinite manner in which posture is sometimes made a subject of remark by parents and teachers, while it shows, that they are themselves only half informed upon the subject, is calculated to exert no influence in producing a reform. Children must be made to *understand* why

a crooked and stooping posture, why the habit of resting on one foot, and lacing the body in tight stays, are injurious to health. Are they likely to be made to understand it, while parents and teachers, who have the more immediate direction of them, are uninformed?

We must do more than simply tell them that they ought to exercise. They should know the physiological reasons why it is necessary. Starting from the point that man was designed, as all the organs prove, to be a laboring animal, they should be made to understand the manner in which labor produces its salutary effects upon the muscles; the heart and arteries; the veins, the brain and nerves; the stomach, liver and other digestive organs. Obtaining in this way clear and definite ideas, they would be more likely to adopt those habits of regular exercise, which a life devoted to literary pursuits requires. Who are so well calculated to communicate this information, as parents and teachers, whose business it is to rear them up for usefulness in life?

I might explain the structure and functions of the eye; its intimate connexions with every part of the body, particularly the brain. You would cease to wonder that the prematurely excessive and unscientific use to which our little boys and girls sometimes subject this organ, in the modern system of education, renders some of its annoying and incurable diseases so common an attendant upon a cultivated mind. A physiological view of this subject would best prove the folly of permitting children to prolong their studies far into the night; and make both parents and teachers look with less complacency upon evening lessons and home tasks. The eyes of few adults are able to support such continued labor. Why should the growing organ of the young be more likely to do it with impunity?

The science of physiology unfolds the numerous evidences of the intimate and reciprocal connexions between the moral and

physical man ; and best ascertains the importance of an harmonious condition of the feelings, the passions and desires, to the health of the body as well as the mind. In its study, we obtain the clearest views of the physical injury that may be occasioned, especially in the young, by the depressing feelings of peevishness and discontent ; the corroding influence of envy and misdirected ambition ; and the more stormy passions of anger or revenge. It teaches us, that these, or any of the unholy passions of an ill directed mind, are capable of drying up, not only the sources of happiness, but the sources of life. Seeing this, we become more fully impressed with the great fact, that all modes of education fall far short of perfection, which, whatever advantages they may combine for the advancement of the intellect, overlook the cultivation of the moral and religious feelings.

What new inducements are here presented to parents and teachers, to be sure that nothing exists in the domestic or school arrangements, calculated to kindle or keep alive any of these unchristian feelings ! that all rewards and punishments should be such only as are in harmony with the intellectual, moral and physical health of children ! How important that *they* should possess what they desire them to exhibit — kind, patient, contented dispositions ! that they should never be betrayed by an ill regulated temper, into little acts of injustice, of which children always have so keen a perception ; and which sometimes inflict so deep an injury upon their feelings. How important that both parents and teachers should repress all those unreasonable expectations, and avoid that impatience of spirit which, overlooking the condition, the peculiarities, and the natural rights of children, so often render the school room, and even the paternal mansion, anything but the place of their affections !

Such are the views presented to my mind, by a consideration of the relations subsisting between physiology and education.

The narrow limits of this occasion have necessarily confined us to a very superficial examination of the subject ; and only permitted a passing glance at some of the suggestions naturally arising from it. A more thorough investigation would evidently multiply the proofs of its importance to the cause of education ; and impress both parents and teachers, with the solemn duty of becoming acquainted with its principles.

The cause of education is eminently the cause of human happiness. It is the cause of liberty and religion. It is the cause of God. It is therefore destined to advance with a progress such as the world has never yet seen. Each generation is expected to look back upon the past, and improve by its mistakes. It is one of the most cheering omens of ours, that parents and teachers are beginning to concentrate upon all these, the only light by which they can be distinctly seen ; the light of physiology. The more it is studied, the more its importance will be felt. No other science will so clearly reveal some of the errors that have prevailed in all ages, upon the subject of education. No other will discover so plainly the rocks upon which many have split ; and against which, unless they are removed, we also are in danger of stumbling. When its claims are distinctly seen, and rightly appreciated, and the improvements suggested by them generally adopted, deranged health will cease to be considered the probable attendant of a cultivated mind. The school room will be no longer the object of the child's aversion. Learning will present the same attractions to the young, that it does to older minds. A more vigorous, healthy, practical literature will bless the world ; and the ' *mens sana in corpore sano* ' will become a more common reward of high intellectual accomplishments.

